Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Modifications for Efficient NIMROD Stellarator Dynamics Computations[1] C.R. SOVINEC, C.M. GUILBAULT, T.A. BECHTEL, University of Wisconsin - Madison — When pushed to high-beta conditions that are expected to excite MHD activity, stellarator and heliotron experiments show remarkable robustness and avoid disruptive behavior [1]. Time-dependent studies of the nonlinear evolution have been accomplished [for example, 2-3], but accurately representing the dynamics presents computational challenges. To meet these challenges, a variant of the NIMROD code is being developed to allow: expanding metric information and equilibrium fields in toroidal Fourier harmonics, performing all spatial integration at nodes over the toroidal angle, and incorporating 1D solves over the toroidal angle to complement existing preconditioner strategies. Besides these changes to the physics kernel, pre-processing is being modified for the setup of stellarator computations. Computational choices with respect to the new geometric representation are presented, together with results from verification tests. Progress on preconditioning the 3D algebraic systems is also presented. [1] A. Weller, et al., NF 49, 065016 (2009). [2] K. Ichiguchi, et al., PPCF 55, 014009 (2013). [3] T. A. Bechtel, C. C. Hegna, and C. R. Sovinec, this meeting.

[1]Work supported by US DOE grant DE-SC0018642.

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Date submitted: 03 Jul 2019 Electronic form version 1.4